CLAIMS:

1. An integrated circuit (10) for noise removal in a magnetic nano-particle sensor device, the integrated circuit comprising:

- at least one first magnetic field generator (11) and at least one magneto-resistive sensor (12), said at least one first magnetic field generator (11) being suitable for generating a first magnetic field component (22) in a sensitive direction of the at least one magneto-resistive sensor (12),
- means for determining an operation point of the at least one magneto-resistive sensor (12),

there being a second magnetic field generator for generating a magnetic field for magnetising the nano-particles (20) to thereby generate a second magnetic field component (26) in the sensitive direction of the at least one magneto-resistive sensor (12), the integrated circuit furthermore comprising at least one noise optimisation circuit (13) adapted for stabilising the net magnetic field strength in the sensor (12) by compensating for said second magnetic field component (26).

2. An integrated circuit (10) according to claim 1, wherein said second magnetic field generator is a magnetic field generator external to the integrated circuit (10).

3. An integrated circuit (10) according to claim 1 or 2, wherein, for said operation point, the signal to noise ratio is at least 1.

4. An integrated circuit (10) according to any of claims 1 to 3, wherein said at least one first magnetic field generator comprises a conductor (11).

5. An integrated circuit (10) according to any of the previous claims, wherein said at least one magneto-resistive sensor (12) comprises an upper side (18) and a lower side (19), said upper side (18) and lower side (19) being opposite to each other, and wherein the at least one magnetic field generator (11) is positioned at the lower side (19) of the at least one magneto-resistive sensor (12).

6. An integrated circuit (10) according to claim 5, the integrated circuit (10) comprising two magneto-resistive sensors ($12_1$, $12_2$) adjacent to each other and a magnetic field generator ($11_1$, $11_2$) positioned at the lower side (19) of each magneto-resistive sensor ($12_1$, $12_2$).

7. An integrated circuit (10) according to any of claims 1 to 6, wherein said magneto-resistive sensor (12) has a long and narrow stripe geometry.

8. An integrated circuit (10) according to any of claims 1 to 7, wherein said first magnetic field generator (11) is integrated into said magnetoresistive sensor (12).

9. An integrated circuit (10) according to any of the previous claims, wherein said noise optimisation circuit (13) comprises an integrator device (24).

10. An integrated circuit (10) according to any of the previous claims, wherein said noise optimisation circuit (13) furthermore comprises a harmonic modulation source (23).

11. An integrated circuit (10) according to any of claims 1 to 10, wherein the second magnetic field generator comprises one or more conductors (32).

12. A biochip comprising the integrated circuit according to any of the preceding claims.

13. A method for noise removal in a magnetic nano-particle sensor device, the method comprising:

- generating a first magnetic field component (22) in a sensitive direction of a magneto-resistive sensor (12),
- determining an operation point of the magneto-resistive sensor (12) by minimising the noise at the output of said magneto-resistive sensor (12),
- applying a second magnetic field (25) for magnetising nano-particles (20), thus generating a second magnetic field component (26) in the sensitive direction of the magneto-resistive sensor (12),

- adjusting the first magnetic field component (22) so as to compensate for said second magnetic field component (26).

14. A method according to claim 13, wherein determining an operation point of the magneto-resistive sensor (12) comprises determining an operation point for which the signal to noise ratio is at least 1.

15. A method according to claim 13 or 14, wherein generating a first magnetic field component comprises flowing a conductor current through a conductor (11).

16. A method according to claim 15, wherein adjusting the first magnetic field component is performed by adjusting the conductor current through the conductor (11).

17. A method according to any of claims 13 to 16, the method furthermore comprising:

- determining an operation point of a second magneto-resistive sensor ($12_2$) by minimising the noise at the output of said second magneto-resistive sensor ($12_2$),
- calibrating the difference between the output of said first magneto-resistive sensor ($12_1$) and said second magneto-resistive sensor ($12_2$) to zero.

18. A method according to claim 17, wherein determining an operation point of the second magneto-resistive sensor ($12_2$) comprises determining an operation point for which the signal to noise ratio is at least 1.

19. A method according to any of claims 13 to 18, wherein said second magnetic field (25) is generated by one or more additional conductors (32).

20. A method according to any of claims 13 to 19, wherein the method is applied during the manufacturing of an integrated circuit (10).

21. Use of the integrated circuit as claimed in any of the preceding claims for molecular diagnostics, biological sample analysis or chemical sample analysis.